

Claims

1. A genetically modified cell capable of producing one or more Human Milk Oligosaccharides (HMOs), selected from the list of 3'-sialyllactose (3'-SL), 6'-sialyllactose (6'-SL), Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT),
5 Lacto-N-neotetraose (LNnT), Lacto-N-fucopentaose I (LNFP I), Lacto-N-fucopentaose II (LNFP II), Lacto-N-fucopentaose III (LNFP III), Lacto-N-fucopentaose IV (LNFP IV), and Lacto-N-fucopentaose V (LNFP V), para-lacto-N-neohexaose (pLNnH), and para-lacto-neohexaose II (pLNH-II),
10 wherein said cell comprises a recombinant nucleic acid encoding a protein of SEQ ID NO: 1, or a functional homologue thereof having an amino acid sequence that is at least 80% identical, preferably at least 85% identical, more preferably at least 90% identical to SEQ ID NO: 1.
- 15 2. The genetically modified cell according to claim 1, wherein the oligosaccharide is selected from the list of Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT), Lacto-N-neotetraose (LNnT), Lacto-N-fucopentaose I (LNFP I), Lacto-N-fucopentaose II (LNFP II), Lacto-N-fucopentaose III (LNFP III), Lacto-N-fucopentaose IV (LNFP IV), and Lacto-N-fucopentaose V (LNFP
20 V), para-lacto-N-neohexaose (pLNnH), and para-lacto-neohexaose II (pLNH-II).
3. The genetically modified cell according to any one of the preceding claims, wherein the genetically modified cell is *Escherichia coli*.
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4. The genetically modified cell according to any one of the preceding claims, wherein the cell further comprises a recombinant DNA sequence comprising a regulatory element for the regulation of the expression of the recombinant nucleic acid.
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5. The genetically modified cell according to claim 4, wherein the regulatory element for the regulation of the expression of the recombinant nucleic acid is a promoter element such as a *lac* promoter, *Plac*, or a *glp* promoter, *PglpF*.
- 35 6. A nucleic acid construct comprising a nucleic acid sequence encoding a

- protein of SEQ ID NO: 1, or a functional homologue thereof, having at least 80 % sequence identity to SEQ ID NO: 1, wherein the nucleic acid sequence encoding a protein of SEQ ID NO: 1, has at least 70 % sequence identity to SEQ ID NO: 2, wherein the construct further comprises a nucleic acid sequence comprising a regulatory element selected from the list consisting of a lac promoter, Plac, or a glp promoter, PglpF.
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7. A nucleic acid construct according to claim 6, wherein the regulatory element regulates the expression of the nucleic acid sequence having at least 70 % sequence identity to SEQ ID NO: 2.
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8. A method for the production of an oligosaccharide, the method comprising the steps of:
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- (i) providing a genetically modified cell capable of producing an HMO, wherein said cell comprises a recombinant nucleic acid encoding a protein of SEQ ID NO: 1, or a functional homologue thereof which amino acid sequence is at least 80 % identical, preferably at least 85 % identical, more preferably at least 90 % identical to SEQ ID NO: 1;
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- (ii) culturing the cell according to (i) in a suitable cell culture medium to express said recombinant nucleic acid;
- (iii) harvesting one or more HMOs produced in step (ii).
9. Use of a genetically modified cell according to any one of claims 1 to 5 or a nucleic acid construct according any one of claims 6 to 7 for the production of one or more oligosaccharide, preferably one or more human milk oligosaccharide.
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10. Use of a genetically modified cell according to any one of claims 1 to 5 or a nucleic acid construct according any one of claims 6 to 7 for the production of a specific HMO selected from the list of 3'-sialyllactose (3'-SL), 6'-sialyllactose (6'-SL), Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT), Lacto-N-neotetraose (LNnT), Lacto-N-fucopentaose I (LNFP I), Lacto-N-fucopentaose II (LNFP II), Lacto-N-fucopentaose III (LNFP III), Lacto-N-fucopentaose IV (LNFP IV), and Lacto-N-fucopentaose V (LNFP V), para-
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lacto-N-neohexaose (pLNnH), and para-lacto-neohexaose II (pLNH-II)

- 5 **11.** Use of a genetically modified cell according to any one of claims 1 to 5 or a nucleic acid construct according any one of claims 6 to 7 for the production of a specific HMO selected from the list of Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT), Lacto-N-neotetraose (LNnT), Lacto-N-fucopentaose I (LNFP I), Lacto-N-fucopentaose II (LNFP II), Lacto-N-fucopentaose III (LNFP III), Lacto-N-fucopentaose IV (LNFP IV), and Lacto-N-fucopentaose V (LNFP V), para-lacto-N-neohexaose (pLNnH), and para-lacto-neohexaose II (pLNH-II).
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- 15 **12.** Use of a genetically modified cell according to any one of claims 1 to 5 or a nucleic acid construct according any one of claims 6 to 7 for the production of a specific HMO selected from the list of selected from the group consisting of Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT), Lacto-N-neotetraose (LNnT) and para-lacto-neohexaose II (pLNH-II).
- 20 **13.** Use of a genetically modified cell according to any one of claims 1 to 5 or a nucleic acid construct according any one of claims 6-9 for the production of the specific an HMO selected from the group consisting of Lacto-N-Triose-2 (LNT-2), Lacto-N-tetraose (LNT) and Lacto-N-neotetraose (LNnT).